Contributions to the PALÆONTOLOGY of Illinois and other Western States.

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MOLLUSCA.

LAMELLIBRANCHIATA.

Genus LITHOPHAGA, Bolten, 1798.

(LITHODOMUS, Cuvier, 1817.)

LITHOPHAGA? PERTENUIS, M. & W.

Shell slender, elongated, narrowing anteriorly, extremely thin, moderately convex, in the central and anterior regions, more compressed and cuneate behind; posterior margin narrowly rounded in outline; anterior extremity extremely short and very narrowly rounded; basal margin straight along the middle, and curving up gradually towards the extremities; hinge line straight, not exactly parallel to the base, and apparently about half as long as the shell,—passing imperceptibly into the posterior dorsal margin. Beaks almost terminal, very oblique, and nearly obsolete; umbonal gibbosity slightly raised above the hinge line. Surface smooth, or with only faint traces of fine concentric strie, and very obscure, undefined concentric undulations.

Length, 1·73 inch, height, 0·62 inch; convexity, 0·50 inch.

This species has very nearly the form of the following, but may be distinguished by its smooth surface, which never shows the distinct thread-like concentric striæ and regular wrinkles of that shell. As we know nothing of the hinge and interior of these species, we merely place them provisionally in the genus *Lithophaga*, from the similarity of their external characters, to the recent *L. lithophaga*. Possibly their names should be written *Modiolus lingualis* and *M. pertenuis*, or more properly *Volsella lingualis*, and *V. pertenuis*, as they may belong to that genus, and *Modiolus* and *Modiola* are merely synonyms with the older name *Volsella*.

Locality and position. Warsaw, Illinois. Warsaw division of the subcarboniferous series.

LITHOPHAGA? LINGUALIS, Phillips (?) sp.

Modiola lingualis, Phillips, Geol. Yorkshire, ii, p. 209, pl. v, fig. 2.

The shell we have referred with doubt to Phillips' species cited above, agrees with his figure in so many respects, that we are inclined to believe it probably identical, though it may prove to be distinct on comparison of specimens.*[1] It is an exceedingly thin shell, and ornamented by moderately strong thread-like concentric striæ, which, on the umbonal slopes, sometimes form neat little ridges or undulations, while a few more irregular, distant marks of growth, are seen on other parts of the surface. Some of the specimens are much larger than that figured by Phillips, being nearly three inches in length. The direction of the marks of growth on these larger specimens, show that they were almost exactly like Phillips' figures, when of the same size. They also show that the hinge line is long, straight, and bordered by a slender marginal line within.

Locality and position. Warsaw, Illinois. Keokuk division of subcarboniferous series.

* It is much to be regretted that many of the species figured by Prof. Phillips in his Geology of Yorkshire, have not yet been fully and clearly described.

Genus MODIOLOPSIS, Hall, 1847.

Modiolopsis perovata, M. & W.

Shell longitudinally ovate, the widest part being a little behind the middle, compressed, very thin, extremely inequilateral and oblique; posterior side compressed, cuneate, regularly rounded in outline; anterior side very short, more narrowly rounded than the posterior margin. Dorsal outline forming a broad, nearly regular arch from the beaks into the posterior border; base oblique, and somewhat straightened just in front of the middle, and rounding up towards the extremities. Beaks compressed, scarcely projecting beyond the rounded anterior outline, and placed directly over the anterior extremity. Surface marked with regular concentric striæ, and small, irregular furrows. Anterior muscular impression oval, distinct, located close to the margin, under the beak.

Length, 1·92 inches; height, 1·18 inches; convexity, 0·40 inch.

This species has much the general appearance of *Modiolopsis concentrica*, (Hall, Geol. Fourth Dist. p. 196, fig. 9,) but differs in having its anterior outline rounded, instead of protuberant and subangular in outline. Its margin is also more prominent in the antero-ventral region, and without "a longitudinal impression directly below the beaks."

Locality and position. White Sulphur Springs, Delaware County, Ohio. Hamilton Group, of Devonian series.

Genus PLEUROPHORUS, King, 1844.

Pleurophorus subcostatus.

Shell elongate-oblong, moderately convex; umbonal ridges the most convex part of the valves, and extending obliquely from the beaks towards the postero-basal margin; anteror ventral region somewhat compressed; basal and cardinal margins very nearly straight and subparallel, the former being usually somewhat sinuous or arcuate along the middle; extremities rather narrowly rounded, the posterior being generally a little wider than the other, and sometimes faintly subtruncate obliquely. Hinge line long and nearly straight; posterior lateral tooth of each valve elongated parallel to the hinge margin, very remote from the cardinal teeth, and extending back a little beyond the posterior muscular impression. Beaks depressed upon a line with the dorsal margin, small, somewhat compressed, and placed about one-ninth the entire length of the shell behind the anterior margin. Scar of the anterior adductor muscle deep, trigonal-subovate, pointed above, and strongly defined by the prominent vertical ridge just behind it; those of the pedal muscles small, nearly marginal, and located directly over the anterior adductors; posterior adductor scars larger and more shallow than the anterior, subquadrate in outline, and placed close up under the posterior hinge teeth. Pallial impression well defined. Surface of casts showing traces of a few obscure concentric markings, crossed on the postero-dorsal region by traces of about three equal obscure radiating costæ. Exterior surface and cardinal teeth unknown.

Length of a medium sized specimen, (internal cast,) 0·88 inch; height of do., 0·37 inch; convexity, 0·26 inch. Some larger specimens of same proportion, measure 1·33 inches in length.

This species is apparently related to *P. costatus*, of Brown (sp.), some varieties of which, as figured by Prof. King (Monogr. Permian Fossils, England, pl. xv,) it closely resembles, at any rate, so far as can be determined from the comparison of internal casts. Yet it evidently differs from that species, in having the scars of its pedal muscles nearly marginal, and placed *directly over* those of the anterior adductors, instead of partly behind them upon the internal ridge. This ridge is also stronger in our species; while the basal margins of its valves are likewise more sinuous.

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This shell is also scarcely distinguishable from a form that has been regarded as a variety of *P. subcuneata*, Meek & Hayden, in the Permian and Permo carboniferous beds of Kansas. Whether specifically identical with this Kansas shell, (the supposed variety of *P. subcuneata*,) may admit of some doubt; but it certainly differs materially from the typical form of *P. subcuneata*, not only in attaining a much larger size, but in its distinctly sinuous instead of convex basal margin; also in the presence of radiating postero-dorsal costæ.

Locality and position. North branch Saline Creek, Gallatin County, Ill., in a bed belonging to the upper Coal Measures.

PLEUROPHORUS? ANGULATUS, M. & W.

Shell oblong, about twice and a half as long as high, rather convex; cardinal and ventral margins straight and parallel, or the latter very faintly sinuous along the middle; posterior side (which is a little imperfect in our specimen,) apparently obliquely truncated above, and very narrowly rounded below; anterior side very short, sloping abruptly from the beaks above, and abruptly rounded beneath; hinge line very straight, rather long, but shorter than the base. Beaks depressed upon a line with the dorsal outline, and located very near the anterior margin; umbonal ridge prominent and distinctly angular from the beaks to the posterior basal extremity. Surface of internal cast, showing faint traces of two or three distant, very obscure, concentric ridges, or undulations.

Length, 0·52 inch; height, 0·20 inch; convexity, 0·16 inch.

This is one of the kind of forms usually referred by palæontologists to *Cypricardia*, but as we very much doubt the existence of that genus, as properly restricted to such types as the recent *C. guinaca*, Lamarck, during the deposition of the palæozoic rocks, we have concluded to refer it provisionally to the genus *Pleurophorus*. Until its hinge and internal characters, however, can be more clearly determined, its true relations must remain doubtful.

The most marked peculiarities of the species are its oblong form, straight and parallel cardinal and ventral margins, and distinctly angular umbonal ridge. Its anterior muscular impressions seem not to be as distinct as usual in the genus *Pleurophorus*, but this may be due to a defect in our specimen, which is an internal cast. All we know of the hinge, is an impression of a long, linear posterior lateral tooth, parallel to the cardinal margin, and most distinct behind. This tooth appears to have been double in the left valve, for the reception of a similar elongated tooth in the right.

Locality and position. Wabash Cut-off, near New Harmony, Indiana.

PLEUROPHORUS COSTATIFORMIS, M. & W.

Shell elongate, subovaI, moderately convex, slightly arcuate; the dorsal and ventral margins rather long and nearly parallel, the former being a little concave in outline, and the latter convex; extremities narrowly rounded. Beaks small, depressed, or scarcely rising above the dorsal margin,—oblique, somewhat compressed, incurved, and placed very near the anterior end; lunule small, moderately deep. Surface ornamented by concentric striæ of growth, and a few stronger concentric ridges, crossed on the postero-dorsal and dorsal regions, by five distinct equidistant, radiating ridges or plications, extending obliquely from the beaks to the posterior margin. Of these plications, the lowest is the most prominent, and forms the umbonal ridge; while the upper one runs parallel to the cardinal margin, and forms the boundary of the long corselet or escutcheon. (Hinge and interior unknown.)

Length, about 1·10 inch; height, 0 46 inch; convexity, 0·43 inch.

At the same time that we propose to name this as a new species, we confess that if we had found it in Permian strata, we should have, from its

external characters at least, referred it to *Pleurophorus costatus*, Brown, (sp.) Indeed it seems to be as nearly like Prof. King's principal figure of that species, (f. 13, pl. xv, Perm. Foss. of England,) as any other individual specimen could possibly be expected to be, and more nearly like it than any other figure of that shell we have ever seen. Nevertheless, from the different horizons occupied by these shells, we have scarcely a doubt that, if we could see the hinge and interior of that now before us, good specific differences would be observable.

Locality and position. Keokuk division of the subcarboniferous series, Warsaw, Illinois.

Genus GRAMMYSIA, De Verneuil, 1847.

Grammysia ? rhomboidalis, M. & W.

Shell rather large, very gibbous, presenting a rhombic form as seen in a side view, and a distinctly cordate outline as seen in an anterior or posterior view ; umbonal slopes extremely prominent and very oblique ; beaks nearly terminal, approximate at their points, rising above the hinge line, and distinctly curved inwards and forwards ; anterior and antero-ventral regions immediately in front of the oblique umbonal ridge, abruptly contracted, with a broad undefined depression extending from the front part of the beaks obliquely to a point near the middle of the base ; dorsal region between the umbonal ridge and the cardinal margin, a little concave near the beaks. Posterior margin obliquely truncated with a moderately convex outline to the posterior basal extremity, which is subangular, or very narrowly rounded ; base rather long, a little convex in outline behind the middle, and straight or slightly sinuous just in front of it, but rounding obliquely upward anteriorly. Anterior side (which is imperfect in our specimen) short, or apparently scarcely projecting beyond the beaks, more or less obliquely rounded and somewhat gaping ; cardinal margin (judging from casts) rather short, and inflected so as to form behind the beaks a distinctly defined, rather wide depression or escutcheon. Surface, as near as can be determined from casts, ornamented with small, regular concentric ridges. Hinge, muscular and pallial impressions unknown.

Length, about 3·55 inches ; height, 2·06 inches ; greatest breadth (near the middle of valves), 2·42 inches.

The most marked peculiarities about this shell, are the remarkable prominence and obliquity of its umbonal ridges, — which near the beaks stand out as if compressed antero-posteriorly,—and the nearly terminal, obliquely incurved character of the beaks. The specimen is not in a condition to show whether or not it has a distinct lunule in front of the beaks, but we suspect that it has. In some respects it resembles in form *Cyrtodonta Hindi* of Billings, from the Cincinnati group, or so called Hudson river bed of Canada, but differs in having its umbonal ridges so much more prominent as to give greater convexity to the valves ; while its umbones, although more prominent, are much narrower in their antero posterior diameter. More important differences, however, are the presence of a broad undefined sulcus extending obliquely from the anterior side of the beaks of our shell, to near the middle of its base, and the apparent slightly gaping character of its anterior side. Notwithstanding the general resemblance of these forms, there can be little doubt but they really belong to distinct families, since the Canadian shell doubtless belongs to the *Arcidæ*, while that before us appears to be related to the *Anatinidæ*.

Although we have placed our shell provisionally in the genus *Grammysia*, we strongly suspect that when its hinge and interior can be seen, it will be found to be either generically or subgenerically distinct from *G. bisulcata*, Con. sp., the type upon which that genus was founded. At any rate, it differs materially in form, and the prominence of its umbonal ridges, as well as

in the absence of a mesial ridge extending from the beaks to the middle of its basal margin, from that and other well determined species of the genus.

Should it be found necessary to establish a new genus for this shell, we would propose to call it *Rhombocardia*. We remember a similar, but distinct species, from the New York Hamilton Group, which, if we mistake not, has been described by Mr. Conrad, though we cannot just now recall its name.

Locality and position.—Bake-oven, Jackson Co., Illinois, Hamilton Group.

Genus CONOCARDIUM, Brown, 1837.

Conocardium obliquum, M. & W.

Shell rather small, obliquely subtrigonal, gibbous; anterior side (posterior of Woodward) very obliquely and abruptly truncated with a forward slope, and flattened so as to present a regular cordate outline in a front view; anterior auricle narrow, but of unknown length; base very short; posterior margin sloping up from the base so as to intersect the hinge at an angle of about 45°, rather widely gaping, and crenate its entire length. Beaks moderately prominent, small, strongly incurved; umbonal slopes very prominent, angular, and directed obliquely forward to the angular anterior basal extremity. Surface ornamented with rather sharply elevated, threadlike, subcrenate radiating ribs, narrower than the depressions between; each of these depressions on the posterior and flattened anterior sides of the valves occupied by a smaller intermediate rib; entire surface also marked by fine very regular radiating and concentric striæ, so as to produce a neat minutely cancellated sculpturing, as seen under a magnifier.

Length from the posterior extremity to the produced antero-basal angle, 0·70 inch; height from the latter to the beaks, 0·50 inch; length from the beaks to the posterior extremity, 0·37 inch; convexity, 0·44 inch; breadth of posterior hiatus, 0·17 inch.

We know of no other species liable to be confounded with this. Its most marked features are the great backward obliquity of its umbonal axis, by which its beaks are placed even a little behind the middle of the body part of the shell; and the beautiful regular cancellated style of ornament seen between the ribs, under a magnifier.

Locality and position.—Coal Measures. Wabash Cut-off, Posey County, Ind.

Genus EDMONDIA, De Koninck, 1842.

Edmondia? peroblonga, M. &. W.

Shell oblong, the length being about double the height, very inequilateral, moderately convex; the greatest convexity along the oblique umbonal slopes, above and below which the valves are cuneate postero-dorsally, and antero-ventrally. Posterior side distinctly compressed near the extremity, its margin rounded or subtruncate in outline; anterior side very short, less compressed and rather more narrowly rounded than the other; basal and dorsal margins nearly straight and parallel, the former being very slightly convex in outline a little in advance of the middle. Beaks near the anterior end, very oblique, compressed, and but slightly elevated above the hinge margin; umbonal slopes prominently rounded from the beaks obliquely to near the posterior inferior margin. Surface of cast showing only faint traces of a few irregular concentric undulations below the umbonal ridge. (Hinge and interior unknown.)

Length, 2·46 inch; height 1·25 inch. Convexity of a left valve, 0·47 inch.

Although we have but a cast of this shell, showing neither the hinge, internal characters, nor the surface markings, we have thought it should be indicated, as better specimens can scarcely be expected from such a matrix. We confess, however, that we are totally at a loss respecting its generic characters, and merely place it provisionally in the genus *Edmondia*.

In general appearance this shell approaches *Edmondia? compressa*, of McCoy, (Carb. Foss. Ireland, pl. 13, fig. 10,) but it is rather longer in proportion to its height, and has much less prominent, and more compressed beaks, as well as subangular, instead of rounded umbonal slopes.

Locality and position.—Lasalle, Illinois. Siliceous limestone of the Upper Coal Measures.

Genus CHÆNOMYA, Meek, 1865.*

CHÆNOMYA ? RHOMBOIDEA, M. & W.

Shell rather small, short, moderately convex; outline rhombic as seen in a side view; basal and dorsal margins nearly straight and parallel; the former very abruptly curved upwards behind, and more gradually in front; anterior side very short and truncated or a little rounded; posterior side distinctly truncated (obliquely) nearly the entire breadth or height of the valves, gaping but not dilated; dorsal margin less than the entire length of the shell, and inflected so as to form a narrow but well defined escutcheon or false area. Beaks narrow, or compressed antero-posteriorly, rather pointed, prominent and incurved, nearly terminal or placed directly over the anterior margin. Umbonal slopes oblique, very prominent near the beaks, but less so along the central and postero-ventral regions; anterior and ventral regions abruptly cuneate, with a very faint undefined impression extending from the beaks obliquely backwards, towards the middle of the base, just in front of the umbonal prominence. Surface of cast ornamented with small, regular concentric undulations, with apparently very faint indications of very small radiating striæ.

Length 1·17 inches; height from ventral to cardinal margin, 0·80 inch, do. to summit of beaks, 0·90 inch; convexity, 0·65 inch; gape of valves behind, 0·25 inch.

Although this species seems to agree, in most of its known characters, with the types upon which the genus *Chænomya* was established, it differs in being a proportionally shorter and less widely gaping shell, while its beaks are much more prominent and oblique. As we know nothing of its hinge or interior, nor of its finer surface markings, it is only provisionally that we place it in the genus *Chænomya*. Possibly we should call it *Allorisma rhomboidalis*, or *Sedgwickia rhomboidalis*.

Locality and position.—St. Louis Limestone, of Subcarboniferous Series. Alton, Illinois.

CHÆNOMYA ? HYBRIDA, M. & W.

Shell longitudinally oblong, moderately convex, somewhat arcuate; dorsal margin concave in outline, ventral border longer than the dorsal, and forming a broad gentle curve nearly parallel to the dorsal outline, excepting a very faint sinuosity in advance of the middle; posterior side a little compressed near the extremity, but rather distinctly gaping—truncated or somewhat rounded in outline; anterior margin sloping forward from the beaks above, and apparently narrowly rounded below. Beaks moderately prominent, somewhat compressed, and placed less than one-fourth the length of the valves from the anterior extremity; umbonal slopes not prominent; flanks evenly convex in the central region, and a little contracted anteriorly, so as to form a very faint undefined depression from the beaks to the base. Surface (of a cast) showing small, obscure concentric ridges, which are most distinct and regular along the posterior umbonal slopes, where they are abruptly deflected upward at an obtuse angle; anteriorly they are smaller, more closely arranged, and deflected obliquely forward and upward.

* In describing the genus *Chænomya* in the Palæontology of Up. Mo., p. 42, 1865, some doubts were expressed by me, in a foot note, whether or not it might be identical with *Anthracomya*, of Salter, a description of which I had not at that time seen. Since seeing Mr. Salter's figures and description, I am entirely satisfied that these forms belong to clearly distinct genera.—F. B. M.

Length, 1·90 inches; height to cardinal margin, 0·90 inch; to summit of beaks, 1 inch; convexity, 0·68 inch.

This is another form that can only be referred provisionally to the genus *Chænomya*, since we know nothing of its hinge and muscular and pallial impressions. It has the form of the typical species of that group, excepting that its posterior extremity is more compressed, and not so widely gaping. Its most peculiar surface character, is the abrupt deflection of its obscure concentric ridges, which give it much the appearance of a *Goniomya*. Indeed if found amongst Cretaceous or Jurassic fossils, we would not hesitate to refer it to that genus. As in some species of *Goniomya*, the ridges run parallel to the base along the middle of the valves, between the points where they are deflected. Perhaps we should call it *Allorisma hybrida*, but for the present we refer it provisionally to the genus *Chænomya*. We know of no species with which it is liable to be confounded.

Locality and position.—Keokuk division of the Subcarboniferous Series; Nauvoo, Illinois.

Genus SEDGWICKIA, McCoy, 1844.

SEDGWICKIA (SANGUINOLITES ?) SUBARCUATA, M. and W.

Shell elongate, suboval, somewhat arcuate, rather convex in the central anterior, and umbonal regions; anterior side sloping, with a slightly convex outline from the beaks forward, and rather narrowly rounded at the extremity; posterior side narrow and compressed above and behind the umbonal ridge, and obliquely truncated at the extremity; dorsal outline horizontal and concave behind the beaks; ventral margin forming a long gentle convex curve, nearly parallel to the dorsal margin, curving up gradually towards the front, and very abruptly at the posterior basal extremity. Beaks moderately prominent, and placed about one-third the entire length of the shell from the anterior extremity; umbonal ridge prominently rounded from the beaks to near the posterior basal extremity. Surface of cast without visible concentric ridges or other markings.

Length, 2·20 inches; height, 0·95 inch; convexity, 0·72 inch.

We are by no means sure that this shell belongs to the genus *Sedgwickia*, as properly restricted to such forms as *S. attenuata* and *S. corrugata* of McCoy, since it is more elongated, and wants the concentric ridges usually seen on these shells. In general outline it approaches some species of *Cercomya*, Agassiz, such for instance as *C. striata*, from the upper jura, but its posterior umbonal ridge is not so angular, while its surface, judging from internal casts, seems to have been very nearly smooth. As we only know it from casts, nothing can be determined in regard to its hinge, nor have we any means of ascertaining the nature of its muscular and pallial impressions. Possibly we should call it *Allorisma subarcuata*, though its rather prominent umbonal ridge, compressed posterior dorsal region, apparently smooth surface, and convex anterior slope, without a depression in front of the beaks, give it a kind of *Lyonsia* like aspect, not seen in the known species of that genus.

Locality and position.—Upper beds of the Keokuk division of the Subcarboniferous series.

GASTEROPODA.

Genus HOLOPEA, Hall, 1847.

Subgenus ISONEMA, M. & W.

ISONEMA DEPRESSA, M. & W.

Shell much depressed, considerably wider than high: volutions nearly four, increasing rather rapidly in size, obliquely compressed, with a slightly convex outward slope above,—last one subangular around the middle, and

about as convex below as above the angle; suture well defined; aperture rhomboid suborbicular, more rounded on the inner than the outer side; outer lip sharp and oblique in outline; inner lip flattened, or somewhat furrowed below, apparently for the reception of the edge of an operculum; umbilical region very slightly impressed, but not perforated. Surface ornamented with strong, very regular, transverse lines, most distinct on the upper side of the whorls, where they cross from the suture a little obliquely backwards, with a slight forward curve, to the periphery, over which they cross in the same oblique direction, and pass on towards the umbilical region without any visible curve.

Height, 0·41 inch; breadth, 0·50 inch.

This shell may be regarded as the type of a group apparently related to *Holopea* and *Cyclonema*, though it may be distinct from both. In some respects it seems more nearly related to the latter group, but differs from the known species of that genus, in having no traces of revolving lines. From the typical forms of *Holopea*, it differs in having its volutions much less rounded above, and more prominent or subangular around the middle, and its transverse lines much more distinct. In its surface markings, and general appearance, it very closely resembles *Isonema bellatula* (*Loxonema bellatula*,* Hall, Fifteenth Report of Regents, pl. 4, fig. 4,) evidently belonging to the same group, but it differs specifically in being much more depressed, or almost subdiscoidal.

Judging from some Ohio specimens, apparently identical with *Isonema bellatula*, Hall, (sp.,) it seems probable that some species of this group may be slightly umbilicate.

Locality and position.—White Sulphur Springs, Delaware County, Ohio, Hamilton division of the Devonian series.

Genus PLEUROTOMARIA, Defrance, 1825.

PLEUROTOMARIA (MURCHISONIA?) META, M. & W.

Shell rather small, conical; spire elevated; volutions six or seven, rounded, increasing regularly and gradually from the apex; last one slightly produced below, and forming about one-third of the entire length. Suture deep and well defined, in consequence of the convexity of the whorls. Spiral band flat, smooth, scarcely impressed below the general surface, and placed near the middle of the whorls; one third as wide as the volutions of the spire. Surface without revolving striæ, or ridges, but ornamented by small, regular, oblique costæ, which in crossing the upper side of the whorls, curve gracefully backwards as they approach the band, below which they are nearly obsolete and curve forward. Aperture orbicular; columella apparently perforated by a very small umbilicus.

Length, 0·37 inch; breadth, 0·23 inch; apical angle regular, divergence about 40°.

This species will be distinguished by its produced conical spire, and rounded, gradually enlarging volutions, which characters give it an intermediate appearance between the genera *Murchisonia* and *Pleurotomaria*. In form it is much like *Pleurotomaria trilineata*, Hall, but it differs from that species in being entirely without revolving markings.

Locality and position.—Warsaw, Illinois. Keokuk division of Subcarboniferous Series.

PTEROPODA.

? Genus CONULARIA, Miller, 1818.

CONULARIA MULTICOSTATA, M. & W.

Shell with sides equal and tapering to the apex at an angle of about 22½°;

* We cannot believe these forms can be properly included in the genus *Loxonema*, as restricted to such shells as the typical *Terebra sinuosa*, of Sowerby.

furrows at the angles distinct and linear; sides without a mesial furrow. Costæ exceedingly fine and closely arranged, arching gently towards the aperture, and sometimes interrupted or alternating at the middle; most distant at about 0·80 inch from the apex, where there are 10 or 11 in the space of 0·20 inch, while about 18 occupy the same space near the aperture; all, as well as the depressions between, very minutely crenate or granulose.

Length, 1·30 inches; breadth, 0·80 inch.

This species is remarkable for its extremely slender, and closely crowded costæ, which are not readily seen at a little distance; and it is only under a good magnifier that the very minute crenulations can be seen. The spaces between the costæ are slightly wider than the costæ themselves, and apparently marked by minute cross-lines, or crenulations, coincident with those of the costæ. Sometimes they appear to be obsolete on the costæ, and more distinct in the depressions. It is very distinct from all of the described species known to us.

Locality and position.—Richfield, Summit County, Ohio. Waverley Sandstone, 50 to 60 feet below the Millstone Grit.

CONULARIA SUBCARBONARIA, M. & W.

Shell very large, very thin, more or less distinctly and nearly equally foursided, the sides and angles being somewhat rounded, and converging towards the smaller extremity, at an angle of about 18°; section quadrangular, mesial furrow along each side very obscure, those at the angles distinct; aperture subquadrangular, or subrhombic and contracted; lip very profoundly notched, or divided at the angles, so as to form four triangular flaps or appendages, with inflected lateral margins. Surface ornamented with numerous, slender, transverse costæ, which arch slightly towards the aperture in crossing each side, without any interruption or backward curve at the obscure mesial sulcus; costæ regularly crenate, and separated by slightly wider depressions near the middle of the shell, but much more crowded towards the aperture; depressions between the costæ, with very obscure transverse furrows, coincident with the crenatures of the costæ.

Length, about 4·25 inches; greatest breadth, measuring diagonally across between opposite angles of an obliquely compressed specimen, 1·63 inches; greatest breadth of one side, 1·23 inches. Number of costæ in the space of 0·20 inch, near the middle of the shell, 10; do. near the aperture, about 20. Number of crenatures in the same space on each of the costæ, 20.

In general appearance, the species of this genus usually present comparatively little difference, and often they resemble so closely in their ornamentation, as not to be very readily distinguished. Probably the most marked peculiarity of this species is the presence of sharply defined notches in the lip, at the corners, extending down nearly an inch from the margins of the aperture, and widening upwards, so as to divide the lip into four subtriangular flaps, which bend a little inwards, so as to contract the aperture, and cause the widest part of the shell to be an inch or more below its upper extremity. Our specimen is not in a condition to show whether these flaps are pointed or truncated at the extremity.

This species will be readily distinguished from the last by its coarser, and more widely separated, as well as more coarsely crenate costæ, even where the deep notches of its lip cannot be seen.

Locality and position.—Keokuk division of the Subcarboniferous Series. Warsaw, Illinois.

CONULARIA WHITEI, M. & W.

Shell of medium size, tapering at an angle of about thirty degrees. Surface ornamented with distinct, linear, transverse, minutely crenate costæ, which arch upward, or towards the aperture, in crossing the sides, and either pass without interruption, the imaginary mesial line, or more frequently terminate

there, those on opposite sides of this line alternating. Depressions between the costæ several times as wide as the costæ themselves, but diminishing regularly and gradually in breadth, from the larger to the smaller extremity of the shell.

Length of a specimen incomplete at the larger end, 2·80 inches; breadth, (as obliquely flattened by pressure), 1·20 inch. Number of costæ near the larger end, in 0·30 inch, 6; do. in same space, 0·75 inch from the smaller extremity, 12.

This species presents a marked contrast to the last, in its more widely separated costæ, as well as in having the costæ much more finely crenate; indeed, to the natural eye, they seem to be perfectly smooth. When carefully examined under a magnifier, however, they are seen to be very minutely crenate.

Locality and position.—Waverley Sandstone, Richfield, Summit County, Ohio, 50 to 60 feet below the Millstone Grit.

? Genus TENTACULITES, Schlotheim, 1820.

TENTACULITES TENUISTRIATUS, M. & W.

Shell attaining a rather large size, gradually tapering, and a little curved: annulations large, prominent, rather obtuse near the smaller end; separated by rounded constrictions of about 0·10 inch breadth at the larger extremity of a specimen one inch or more in length. Surface marked by numerous, very fine, regular, closely arranged longitudinal striæ, most distinctly marked in the rounded depressions between the annulations. Aperture circular.

Length, 1·16 inches; breadth at the aperture, measuring upon one of the rings, 0·25 inch; do. between the rings, 0·19 inch; space occupied by four rings and the three intervening spaces at the larger end, 0·30 inch; while the same space includes six rings at the smaller end.

This species resembles rather closely the enlarged figure of a form from the same horizon, referred by Prof. Hall to his *T. flexuosa*, (pl. 78 fig. 26, Palæont. N. Y. Vol. 1.); but its annulations are sharper, and its longitudinal striæ more crowded; while the natural size of the New York species is much smaller.

Dr. Shumard has also described, under the name *T. incurvus*, (Missouri Report, p. 195,) a similar form, though his species is much smaller, with more crowded rings, while it also differs in having minute annular striæ.

Locality and position.—Cincinnati Group of Lower Silurian Series. Alexander County, Illinois.

TENTACULITES OSWEGOENSIS, M. & W.

Shell attaining a rather large size, very gradually tapering to an acute point, distinctly arched, particularly towards the smaller extremity; section circular; annulations rather prominent, somewhat obtuse, from three to three and a half in a space equalling the transverse diameter, diminishing very regularly in size, and in their distance apart, from the larger to the smaller extremity. Surface without longitudinal or (visible) transverse striæ.

Length, 1·45 inches; greatest transverse diameter, 0·16 inch; space occupied by six annulations, and five of the intermediate constrictions, at the larger end, 0·35 inch.

This species has much the general appearance of curved individuals of *T. elongatus*, Hall, from the Lower Helderburg Group, (Upper Silurian) of New York, but is decidedly more strongly arched, proportionally more slender, and has more closely arranged annulations, while it shows no traces of the annular striæ seen on the N. Y. species.

From our *T. tenuistriatus*, described on the preceding page, it will be distinguished by its more slender form, more closely arranged rings, and the absence of longitudinal striæ. The last mentioned character, and its much

larger size, will also distinguish it from *T. incurvus*, of Shumard, (Missouri Report, pl. B, fig. 6a, b.)

Locality and position. Cincinnati Group, of Lower Silurian; Oswego, Kendall Co., Ill.

TENTACULITES STERLINGENSIS, M. & W.

Comp. *T. flexuosus*, Hall. Palæont. N. Y., i. p. 284, (not ib. 92.)

Shell small, slightly arched, and gradually tapering to a point; section circular; annulations prominent, angular, rising abruptly from the surface, usually about their own breadth apart; constrictions between the annulations with fine, sharply elevated, longitudinal striæ, which are not continued upon the rings.

Length, 0·56 inch; breadth at the larger end, 0·08 inch; annulations five in the space of $\frac{1}{8}$ of an inch at the larger end, and nine or ten in the same space at the smaller end. Longitudinal striæ, five in the space of 0·02 inch.

It is not improbable that this will prove to be the form from the so-called Hudson River group, referred by Prof. Hall to his *T. flexuosus*, in vol. i. p. 284, Palæont. N. Y. As that specific name, however, was founded upon a Trenton fossil, described as being septate, and having nine rings in $\frac{1}{8}$ of an inch, (being, as is now supposed, the column of a *Cystidian*), the name *flexuosus* could not be properly applied to this form, even if identical with the New York species from the higher position.

It will be distinguished from *T. incurvus*, of Shumard, from the Cape Girardeau Limestone, which it resembles in size and form, by having its annulations arranged about their own breadth, instead of twice that distance apart, as well as in having the longitudinal striæ only defined *between* the rings, instead of also *upon* them.

It seems to be *very* closely allied to *T. distans*, Hall, of the Clinton Group, but differs in being curved instead of straight, as well as in being less rapidly expanding towards the larger end.

From the last of the two foregoing species it will be readily distinguished by its much smaller size, more sharply elevated rings, and distinct longitudinal striæ.

Locality and position. Sterling, Illinois. Cincinnati Group, of the Lower Silurian series.

CEPHALOPODA.

Genus ORTHOCERAS, Auct.

ORTHOCERAS CREBRISTRIATUM, M. & W.

Shell attaining a medium size, rather rapidly tapering, compressed, (in part probably due to accidental pressure); section ellipitical; septa transverse, rather deeply concave, distant less than one-third the greater diameter of the shell at the point of measurement; siphon apparently subcentral. Surface ornamented with numerous, closely and very regularly arranged, equal, thread-like annular striæ, of the same breadth as the depressions between, and differing but slightly in size throughout the entire length of the shell.

Length of the typical specimen (which is partly septate and imperfect at both extremities), 12·50 inches; greater diameter at the larger end, 4·20 inches; smaller do. of same, 2·56 inches. Greater diameter of the smaller end, about 2·13 inches; smaller do. of same, 1·08 inches. Angle of divergence, measuring along the narrower sides, 11°. Annular striæ, 8 in 0·20 inch at the larger end, and 9 or 10 in the same space at the smaller end.

The most marked character of this species is its very regularly arranged, equal striæ, which seem to pass almost, if not quite, directly around the shell. They appear to be simple, uninterrupted and everywhere arranged their own breadth apart. It differs from *O. Laphami*, from the same rock, in its much

more rapid expansion from the smaller to the larger extremity, and in its compressed instead of cylindrical form, as well as in having its striæ passing directly around, instead of obliquely.

Locality and position. Joliet, Illinois; Niagara Group, of Upper Silurian series.

ORTHOCERAS SUBBACULUM, M. & W.

Shell attaining a moderately large size, slender and gradually tapering; entire length, as inferred from the convergence of the sides towards the smaller extremity, about thirty inches; section elliptical, the smaller diameter being to the larger as about 17 to 24. Length of specimen, imperfect at both extremities, 18 inches, of which the outer or body chamber occupies a length of 7·50 inches, while twelve of the smaller chambers occupy the remaining 10·50 inches; greater diameter at larger end, 3·23 inches; smaller do. of same about 2·10 inches; greater diameter at smaller end, 1·90 inches; smaller do. of same, 1·45 inches. Septa transverse, rather deeply concave, separated by chambers, two and a half of which equal the greater diameter of the shell at the point of measurement. Surface and siphon unknown.

At a first glance this species looks much like *O. Bigsbyi*, Stokes, [= *Ormoceras tenuifilum*, Hall], from the Trenton and Black River Limestones, but on a closer inspection it is found to be more compressed and more gradually tapering, while its septa are considerably more distant, and show no backward curve on either side.

Locality and position. Joliet, Illinois. Niagara division of Upper Silurian series.

ORTHOCERAS JOLIETENSE, M. & W.

Shell much elongated, very gradually tapering; section oval or narrow elliptic, (probably to some extent, at least, due to accidental pressure); septa very concave, unusually distant or separated by spaces, equalling three-fourths the greater diameter of the shell at the point of measurement. Siphon and surface unknown.

Length of a septate specimen, imperfect at both extremities, 14·50 inches; greater diameter of do. at larger end, 2·75 inches; smaller do. of same, 1·77 inches; greater diameter at smaller end, 2·16 inches; smaller do. of same, 1·30 inches. Number of septa in the entire 14½ inches, 8.

This species is remarkable for its very gradually tapering form, and unusually distant septa. The latter character will alone distinguish it from any Upper Silurian species known to us, excepting *O. pauciseptum*, Hall, from the Shaly Limestone, of the Lower Heldeburg Group. From this New York species, to which it seems to be nearly related, it will be distinguished by its compressed, instead of cylindrical form. It is true this compression may be in some degree due to accidental pressure, but it seems to be too regular along the entire length of the shell not to be mainly the natural form.

Locality and position. Joliet, Illinois. Niagara division of the Upper Silurian series.

ORTHOCERAS NOBILE, M. & W.

Shell attaining a very large size, rather rapildy tapering; section subcircular, or very slightly flattened on one side. Septa deeply concave, extremely thin, distant about one-fifth the diameter of the shell at the point of measurement; siphon central, round. Surface unknown.

Entire length of a septate specimen incomplete at both ends, 18 inches; greatest diameter at larger end, 8¾ inches; smaller do. of same, 7 inches. Greatest diameter at smaller end, 5 inches; angle of divergence about 14°; diameter of siphon at larger end, 0·80 inch. The entire length of the shell was probably not less than five feet, and its body chamber, owing to the large size and rapid expansion of the shell, must have been very capacious.

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In form and proportions this large species seems to agree nearly with *O. Munsterianum*, of Koninck, from the carboniferous rocks of Vise, Tournay, but it attains a greatly larger size, and also differs in having its siphon central. It is probably the largest species known in our carboniferous rocks.

Locality and position. Randolph County, Illinois. Chester division of Subcarboniferous Series.

ORTHOCERAS WINCHELLII, M. & W.

Shell rather rapidly tapering; section nearly circular, its greater and smaller diameter being as 106 to 100; septa moderately concave, not oblique, distant one-fifth the greater diameter of the shell at the point of measurement, and showing a gentle backward curve in crossing the dorsal and ventral sides; siphon very small at the points where it passes through the septa (probably swollen or beaded between), placed on the shorter axis of the septa only about its own breadth from the margin. Surface nearly smooth, or with more obscure lines of growth, which, like the margins of the septa, make a slight backward curve in crossing the dorsal and ventral sides.

Length of an entirely septate specimen, imperfect at both extremities, 3 inches; greater diameter at the larger end, 1·50 inches; apical angle 15°, apparently becoming greater towards the smaller end.

This species seems to be somewhat similar to *O. occidentale*, of Prof. Winchell, from his Marshall Group (Am. Journ. Sci. vol. xxxiii. 1862, 356), but differs in being more rapidly tapering, and in having its siphon nearly marginal, instead of placed midway between the centre and margin of the septa. If much swollen between the septa, its siphon must be indeed quite marginal at these joints.

Named in honor of Prof. A. Winchell, State Geologist of Michigan.

Locality and position. White Sulphur Springs, Delaware County, Ohio. Hamilton Group. Devonian.

Genus PHRAGMOCERAS, Broderip, 1834.

PHRAGMOCERAS WALSHII, M. & W.

Shell very large, clavato-subluuate in form, moderately arched, increasing rather rapidly in size from the smaller end to near the middle, and thence apparently somewhat tapering towards the aperture; more or less compressed. Outer or body chamber apparently rather short. Septa very oblique, (probably to some extent due to compression and distortion), comparatively closely arranged, the chambers between scarcely equalling one-sixth the greater diameter of the shell at the widest part, and one-eighth towards the smaller end. (Siphon, surface and aperture unknown).

Length of specimen, (imperfect at both extremities), measuring along the middle of the side parallel to the curve, about 15 inches; greatest breadth near the middle, 5 inches; smaller do. at same place, 3·50 inches. Greater breadth at smaller end, 2·40 inches. Of the whole length of the specimen 22 of the smaller chambers form 10 inches, and the remaining portion of the body chamber the other five inches.

The only specimen of this large shell we have seen is very imperfect, and much distorted, so that it is quite probable some of the characters given in the above description, will require more or less correction when good specimens can be obtained. Its large size, general form, and rather closely arranged septa, however, will probably render its identification not very difficult.

The specific name is given in honor of B. D. Walsh, the well known Entomologist, of Rock Island, Ill.

Locality and position. Rock Island, Illinois. Hamilton division of the Devonian.

Genus GOMPHOCERAS, Sowerby, 1839.

Gomphoceras sacculum, M. & W.

Shell small, subfusiform, or clavate, very slightly arched; a little compressed at right angles to the plane of the curve, particularly the nonseptate part, which is more convex on the outer side of the curve than the inner; most ventricose a little above the last septum, thence tapering gradually to the lower extremity and towards the aperture, near which latter there is a slight constriction. Section transversely a little oval near the middle of the shell, and more decidedly so above, but nearly or quite circular towards the lower extremity. Aperture transversely oval, its smaller diameter being about two-thirds the greater; lips faintly sinuous at each end of the aperture, and at the middle of the dorsal side. Septa but slightly concave; (distance between them not distinctly determinable from the specimen examined). Siphon very small; placed on the line of the shorter axis of the septa, about twice its own breadth from the dorsal or outer side of the curve. Surface marked only with small annular striæ, slightly arched backwards near each end of the aperture, parallel to the faint sinuosities of the lip.

Length of specimen, imperfect at the smaller extremity, 1·27 inch; do. of nonseptate part, 0·67 inch; greatest transverse diameter of do., 0·53 inch; shorter diameter of do. at same part, 0·42 inch. Apical angle of septate half of the shell, measuring along each lateral margin, 24°. Breadth of aperture, 0·33 inch; smaller diameter of do., 0·22 inch.

This little shell has the general habit and appearance of *Gomphoceras*, and yet differs from the typical forms of that genus in being slightly arched and not having its aperture so remarkably contracted. In being a little curved, it more nearly resembles *Paragmoceras*, though its curvature is less decided. It is also worthy of note, that the comparatively small contraction of its aperture is mainly on dorsal and ventral margins, while in *Gomphoceras* and *Phragmoceras* the contraction is mainly on each lateral margin. In several respects it approaches *Oncoceras*, Hall, and it is even possible that we would be more nearly correct if we were to call it *Oncoceras sacculum*. Still it differs from the type of that group in being less curved, and compressed dorso-ventrally, instead of laterally, as well as in having its siphon not quite, though nearly marginal.

Locality and position.—White Sulphur Springs, Delaware County, Ohio. Hamilton Group of Devonian Series.

Gomphoceras (Apioceras) turbiniforme, M. & W.

Shell rather small, turbinate, or obovate, very slightly unsymmetrical; section circular, or nearly so; chambered part rapidly expanding, with sides slightly convex above. Non-septate part very short, or three times as wide as long, rounding in abruptly above; aperture contracted, but exact form unknown. Septa only moderately concave, nearly equidistant at all points, excepting near the outer chamber and the apex, where they are more crowded; at about the widest part of the shell, separated by spaces equalling one-eighth its greatest diameter. Siphon small and marginal. Surface nearly smooth, or with only fine lines of growth.

Length of a specimen not quite complete at the smaller extremity, 1·16 inch. Greater breadth (at the junction of the septate and non-septate parts), 1 inch; smaller diameter at the same place, 0·90 inch. Greater diameter at the smaller extremity, 0·32 inch; smaller do. at same place, 0·30 inch. Divergence of apical angle, 30°.

This is a very short turbinate species, somewhat like *G. beta*, Hall, (18th Report Regents, pl. 7, fig. 1), but differs in being proportionally shorter and more ventricose, and in having the septa proportionally more crowded. It shows eleven septa in a space of three-quarters of an inch below the last one, while *G. beta* is described as having only seven or eight in the same space.

Its last three septa are crowded within a space only equalling one of the chambers below.

Locality and position.—Charleston, Indiana. Devonian.

Genus NAUTILUS, Linnæus, 1758.

Subgenus ENDOLOBUS, M. & W.

NAUTILUS (ENDOLOBUS) PERAMPLUS, M. &. W.

Shell attaining a very large size, compressed subglobose; umbilicus rather deep, about as wide as the dorso-ventral diameter of the outer volution, and showing about three-fourths of each inner turn. Whorls three to three and a half, increasing rather rapidly in size, broadly rounded over the dorsal or outer side, and more narrowly round on each lateral margin, where the greatest prominence is a little within the middle; lateral margins each provided with a row of large, broad, depressed, or subnodose prominences, about fourteen of which may be counted on each side of the last turn; from these rows of nodes or mammillary protuberances, the inner side of each whorl rounds abruptly into the umbilicus, and is provided along the middle with a moderately deep, rounded concavity for the reception of each succeeding inner turn. Septa deeply concave on the side facing the aperture; separated by intervals, measuring, on the dorsal side, more than one third the dorso-ventral diameter of the whorls at the point of measurement, passing nearly straight over the broad periphery, and with a very slight forward curve across the sides; while on the inner concave side they are each deflected abruptly backwards, so as to form a deep, more or less funnel-shaped ventral lobe. Siphon placed rather more than its own breadth nearer the inner than outer side. Surface of cast smooth.

Greatest diameter, 20 inches; transverse diameter, 12 inches; dorso-ventral diameter of inner whorl, 8 inches; breadth of umbilicus, 8·50 inches; circumference around the periphery, 4 feet 8 inches.

We know of no shell with which this fine species is liable to be confounded, though it has much the form and general appearance of our *N. spectabilis*, from the same position. It differs, however, in the position of the lobe on the inner side of septa; and in having its siphon located farther in from the outer side. In a side view it presents some general resemblance to *N. tuberculatus*, of Sowerby, as figured by Phillip, in his Geol. Yorkshirei i. pl. 22, fig. 29, though even as thus seen, it will be observed to differ in its broader whorls, and in having the most prominent part of their sides, with their nodes, placed nearer the umbilicus, while in a profile view, it will be distinguished at a glance by its periphery being rounded, instead of nearly flat.

As may be seen by the foregoing description, this species differs from the typical *Nautili*, in the possession of a peculiar funnel-shaped ventral lobe, formed by the backward flexure of the septa. Hence it seems to bear almost exactly the relations to *Nautilus* that the genus *Tretoceras* does to *Orthoceras*; hence we regard it as the type of a group for which we propose the name *Endolobus*.

If Montfort's name, *Bisiphites*, is to be retained, the name of this shell should doubtless be *Bisiphites peramplus*, as the type upon which he proposed to found a genus under that name, seems to have had an inner lobe which he mistook for a second siphon. As his name, however, implies a plain contradiction of fact, we think it should not be used.

Judging from Montfort's figure, his type not only differs from ours, in having the outer whorl enveloping all the others, so as to leave no open umbilicus, but in having the lobe of the septa a little removed from the inner side, instead of being directly in contact with it, as in our shell. He says his type was a large fossil species, attaining a diameter of two feet.

Locality and position.—Randolph County, Illinois. Chester division of Subcarboniferous Series.

NAUTILUS (TEMNOCHEILUS) NIOTENSIS, M. & W.

Shell attaining a large size, globose-subdiscoidal; umbilicus deep, and (considering the lateral margins of the whorls its limits) about twice the dorso-ventral breadth of the outer turn. Volutions about three, contiguous but not embracing, broadly rounded over the dorsal and ventral sides, and prominently angular around the middle of each lateral margin; section transversely elliptic, the two extremities of the ellipse being angular. Septa rather distinctly concave, and distant on the outer side less than half the dorso-ventral diameter of the whorls at the point of measurement,—making a broad backward curve in crossing the inner and outer sides of the whorls, and curving forward to each of the lateral angles; siphon piercing the septa less than its own breadth outside of the middle. (Surface and aperture unknown).

Greatest diameter, measuring across the disk, about 8·50 inches; convexity, or transverse diameter of the whorls, 5 inches; dorso-ventral diameter of the last volution, about 3 inches.

This species belongs to a group of carboniferous *Nautili*, including *N. coronatus*, McCoy, and *N. biangulatus*, *N. multicarinatus* and *N. cariniferous*, Sowerby, &c. These shells are characterized by having a broad, deep, open umbilicus, showing all the volutions, with the outer side of the whorls broadly rounded or flattened, and the middle of each lateral margin prominently angular; the angle being sometimes nodose, while the transverse diameter of the volutions is always greater than the dorso-ventral. The siphon in these shells is generally, or perhaps always, between the middle and outer side of the whorls. Although Prof. McCoy included a much wider range of forms in his group *Temnocheilus*, we think it would be better to restrict it to such species as those mentioned above, all of which were originally included in the group by Prof. McCoy.

Specifically, our shell is perhaps most nearly allied to *Nautilus carinifirous*, of Sowerby, (Min. con. pl. 482, f. 3 and 4) though differing in its proportionally wider umbilicus, merely contiguous volutions, and particularly in never having longitudinal ridges on the outer side of the whorls, at any stages of growth. It also differs in having its septa crossing the outer side of the whorls with a broad backward curve, instead of passing nearly straight over.

Locality and position.—Niota and Warsaw, Illinois. Keokuk Division of Subcarboniferous Series.

Subgenus DISCITES, McCoy, 1844.

NAUTILUS (DISCITES) ORNATUS, Hall.

Var. AMPLUS, M. & W.

The shell we here place provisionally as a variety of *Nautilus* (*Discites*) *ornatus*, Hall, agrees very nearly in most of its characters with that species, but differs in its much larger size, and the proportionally greater dorso-ventral diameter of its volutions, (particularly the outer one), as compared with the breadth of its truncated periphery. In the New York form, these proportions, according to the published figure, (Thirteenth Regents Report, 1860, p. 102), are about as two and one-third to one, in the outer whorl, and nearly equal in the inner turns; while in our shell they bear the proportions of three to one, the flattened sides of the outer volution being three times as wide as its truncated periphery. The type of the New York species is also described as having its "siphuncle dorsal." If by this it is meant that the siphon is in *contact* with the outer side of the shell, as in the Goniatites, then there can be little doubt in regard to the form under consideration being a distinct species, since its siphon is separated from the periphery by a space about equalling its own breadth. It is probably distinct from the New York species, but as individuals of these older types of *Nautilidæ* seem to have varied more

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in form than those of more modern date, we have concluded to place it for the present, as a variety of *N. ornatus*.

To facilitate comparison, we would remark that our shell, when entire, must have measured from 10 to 12 inches in its greatest diameter across the disc; while its outer whorl measures about 5 inches in thickness or convexity at the umbilical side, and 1·50 inches at the periphery. The greatest breadth of the sides of the outer turn is about 4·50 inches. Its septa, as seen on each side, are arranged and curved very nearly as in the typical form of *N. ornatus*, and are deflected backwards on the truncated periphery, so as to form a subtrigonal lobe as deep as wide; they also make a rather broad, deep, backward curve on the inner side. Surface markings unknown.

The shells of this type seem to be very distinct from the typical recent forms of *Nautilus*, and whatever others may think, should, as we believe, be at least regarded as forming a marked subgeneric group. Objections have been raised to the use of McCoy's name, *Discites*, however, because De Haan had used it in 1825 for a type of *Nautilidæ*; but as De Haan merely used it in a kind of synoptical table, with no other characters than "*Sensim incrassatis*," without a figure, or any allusion to any type by which the most remote conjecture can be formed in regard to what group of *Nautilidæ* he meant, it must be evident we cannot regard him as having established either a genus or a subgenus, and the name was consequently free to be used by any other author.

Locality and position.—Hamilton Group (Devonian); "Devil's Bake-oven," Jackson County, Illinois.

NAUTILUS (DISCITES) DISCIFORMIS, M. & W.

Shell attaining a rather large size, discoid, much compressed; umbilicus shallow, a little wider than the dorso-ventral diameter of the outer volution, and showing all the inner turns. Whorls about three and a half, nearly contiguous, or very slightly embracing, nearly flat on each side, the greatest convexity being about half way between the middle and the inner side, from which point the sides round into the umbilicus, and converge to the periphery, which is truncated, narrow and concave. Septa rather closely arranged, crossing the sides of the whorls with a broad, graceful backward curve and more abruptly flexed in the same direction on the truncated periphery, so as to form a subtrigonal lobe about as deep as wide; also, somewhat curved backwards on the inner side of the whorls. Last chamber long, or forming about half the outer volution; others shallow, or usually about equalling one-fifth the dorso-ventral diameter of the volutions at the point of measurement. Siphon small, suboval, located about its own diameter outside of the middle of the whorls. Aperture and section strongly compressed, subovate, the inner side being rounded, and the outer, which is much narrower, truncated, somewhat emarginate, and biangular. (Surface unknown.)

Greatest diameter across the disc, 8½ to 9 inches; dorso-ventral diameter of outer whorl nearly 3 inches; greatest convexity of whorls, about 1·50 inches; breadth of truncated periphery, 0·68 inch.

In size, form, proportions, breadth of umbilicus, &c., as well as in the arrangement and curvature of its septa, this species seems to agree almost exactly with the *discus* of Sowerby. If that species has been correctly figured and described, however, our shell presents the important difference of having its siphon located a little outside of the middle, instead of near the inner margin of the whorls.

Locality and position.—Niota, Hancock County, Illinois. Keokuk Division of Subcarboniferous Series.

NAUTILUS LASALLENSIS, M. & W.

Shell attaining a medium size, compressed, subglobose, or subdiscoidal; umbilicus more than half as wide as the dorso-ventral diameter of the last

whorl at the aperture, moderately deep, and showing about half of each inner turn. Volutions increasing rather gradually in size, very slightly compressed on the dorsal and lateral surfaces, but without the compression imparting any angularity to the dorso-lateral and ventral margins, which are rounded; each concave within for the reception of the inner turns. Septa moderately concave, separated by spaces measuring, on the dorsal or outer side, less than one-third the dorso-ventral diameter of the whorls at the point of measurement, all crossing the sides and dorsum with a broad backward curve. Siphon scarcely more than its own breadth from the ventral or inner side. Aperture, judging from the section of the whorls, about as wide transversely as its diameter, in the direction of the plane of the shell, subquadrilateral, or approaching subreniform, in consequence of the sinuosity of the inner side. Surface unknown.

Greatest diameter about 4·70 inches; convexity about 2·75 inches; breadth of umbilicus, 1·45 inches.

Locality and position.—Upper Coal Measures, Lasalle, Illinois.

Subgenus CRYPTOCERAS, d'Orbigny, 1847.

NAUTILUS (CRYPTOCERAS) CAPAX, M. & W.

Shell attaining a moderately large size, subglobose in form. Umbilicus deep, with abruptly sloping walls,—one third as wide as the dorso ventral diameter of the outer whorl, and showing each of the inner turns. Whorls about two and a half, increasing rapidly in size, particularly in breadth; last one so expanded laterally as to be apparently one third to one half wider than its dorso-ventral diameter; inner ones proportionally narrower. All broadly rounded on the outer side, and more narrowly rounded with a flattened or slightly concave revolving space between the ridge bounding the umbilicus and the middle of each side; each provided with a narrow, shallow impression along the ventral side for the reception of the inner volutions. Septa separated by spaces which measure, on the outer side, less than one fourth the dorso-ventral diameter of the volution at the point of measurement; a little arched backwards on the slightly concave inner side of the whorls, and less distinctly so on the narrow revolving flattened space just outside of the umbilicus, after which they cross over the broadly rounded outer side, with a very broad, scarcely perceptible backward curve. Aperture transversely oval, or subelliptic. Outer chamber very capacious, composing less than half of a volution. (Surface unknown).

Greatest diameter across the disc, about 7 inches; breadth (transverse diameter of the aperture), 6 inches; dorso-ventral diameter 3·25 inches; breadth of umbilicus 1 inch.

The only specimen of this species we have seen is a cast, which shows, along the outer side of the whorls, the appearance of a tube 0·20 inch in diameter, extending backwards from each septum. It is barely possible that this may be a small lobe, but we have scarcely any doubts in regard to its being the siphon, and hence that the species belongs to the group *Cryptoceras*.

Compared with *N. dorsalis*, Phillips (Geol. Yorks, ii. pl. xviii. fig. 1 and 2), the type of the group *Cryptoceras*, our shell will be found to differ in its much more broadly rounded dorsum, and much wider mouth, as well as in the peculiar revolving flattened space near the umbilical side of the whorls, which imparts a slight angularity to the margin of the umbilicus, as well as an undefined longitudinal ridge, or prominence near the middle of the whorls on each side.

Locality and position.—Charboniere, Missouri. Coal Measures.

NAUTILUS (CRYPTOCERAS?) LEIDYI, M. & W.

We only know this shell from the non-septate portion,—forming about one

third of a volution. It indicates a subglobose form for the entire shell, and shows that the umbilicus was deep, with rather abrupt walls, and about as broad as three fourths the dorso-ventral diameter of the body whorl at the aperture. From the curve, and rapid increase in size of the outer chamber, it is evident there could not have been more than two and a half volutions, which are rather broadly rounded over the dorsum and sides, to the margins of the umbilicus, into which the sides round rather abruptly. Towards the aperture, the steep, somewhat flattened inner side of the volution forming the walls of the umbilicus, meets the lateral margins, so as to form a pinched out prominence, that must have imparted a peculiar angularity to the inner margin of the aperture on each side. Just outside of this prominence, the ventro-lateral sides of the outer whorl at the aperture are a little flattened. The aperture is one-fourth wider than its dorso-ventral diameter, and forms about three-fourths of a circle, being deeply rounded on the dorsal side, much flattened within, and angular or apparently abruptly sinuous at each inner lateral margin. These angles at the inner lateral margins, seem even to have projected out somewhat, as in the recent *Argonauta gondola*, of Adams, though not to the same extent. The lip is rather deeply sinuous at the middle of the dorsal side. The septa were moderately concave, and slightly arched backwards on each side. (Siphon and surface unknown).

Greatest diameter of the shell, about 3·75 inches; greatest breadth (at the inner side of aperture), 2.65 inches.

As we have not seen the siphon of this species, we are not sure that it belongs to the group *Cryptoceras*, but from its analogy to the species just described under the name *capax*, which shows apparently a dorsal siphon, we are led to infer that it probably possesses the same character. It differs from that shell, however, in having its body whorl less rapidly expanding, and without a depression along the inner side for the reception of the inner whorls.

Named in honor of Prof. Joseph Leidy, of Philadelphia, Pa.

Locality and position.—Warsaw, Illinois. Keokuk division of the Subcarboniferous Series.

Genus TROCHOCERAS, Barrande, 1847.

Trochoceras ? Baeri, M. & W.

Shell subdiscoidal, consisting of about two or three rather rapidly enlarging volutions, which are more broadly rounded on the outer surface than on each side, and about one-fourth wider transversely than their dorso-ventral diameter; each inner whorl slightly impressing the inner side of the succeeding turn. Umbilicus a little more than half the dorso-ventral diameter of the outer volution, and showing all the inner volutions. Spire apparently scarcely rising above the upper surface of the last turn. Septa rather distinctly concave on the side facing the aperture, separated on the outer side of the whorls, at a point where the dorso-lateral diameter is about 1·25 inches, by spaces measuring 0·35 inches—all showing a very slight backward curve on the rounded periphery, and passing nearly straight across each side. Surface, siphon, and non-septate portion of the shell unknown.

Greatest breadth of the septate part of the shell, 5 inches; height, (estimated) about 2·50 inches. Dorso-ventral diameter of the volutions, increasing about three-fold each turn.

The specimen from which this description was drawn up is defective on one side, so that it is not easy to determine whether or not its whorls are coiled in the same plane, though they have the appearance of being somewhat oblique, and hence we have placed it provisionally in the genus *Trochoceras*. Should it be found, however, when more nearly entire specimens can be examined, that its whorls are coiled all upon the same plane, it would belong either to the genus *Lituites* or *Nautilus*, and hence its name would become *Lituites Baeri*, or *Nautilus Baeri*.

The typical specimen does not show the position of the siphon, but a fragment found near the same locality, and at the same horizon, apparently of this species, though possibly belonging to another shell, has the siphon placed about its own breadth outside of the centre. It pierces the septa from without inwards or backwards, as in *Nautilus*.

At a first glance this shell would seem to resemble *Cryptoceras* (*Lituites*) *undatus*, as represented by fig. 3, pl. 13, vol. i. Palæontology of New York, but on a closer inspection, it will be at once seen to differ materially in the more rapid increase in the breadth of its whorls, and in the proportionally smaller size and greater depth of its umbilicus, as well as in being apparently not coiled on a plane.

The specific name is given in honor of Dr. O. P. Baer, of Richmond, Indiana, to whom we are indebted for the use of the typical specimen.

Locality and position.—Richmond, Indiana. From the Cincinnati Group of the Lower Silurian Series.

ARTICULATA.

CRUSTACEA.

TRILOBITA.

Genus DALMANIA, Emmerich, 1845.

DALMANIA DANÆ, M. & W.

Attaining a large size, entire outline ovate, approaching subelliptic. Cephalic shield rather compressed, nearly semicircular, about twice as wide as long, rounded in front, and nearly straight or slightly concave in outline behind, with posterior lateral angles produced into mucronate spines extending backwards to the fourth thoracic segment. Glabella composing rather more than one-third the entire area of the shield, but slightly more convex than the cheeks; including the neck segment, as long as its greatest anterior breadth, and about twice as wide in front as behind; separated from the cheeks on each side by a well defined furrow; anterior lobe composing about half its entire area, transversely elliptical, and a little less than twice as wide as long; lateral furrows well defined, anterior one oblique; the other two transverse, and not always strongly defined quite out to the lateral margins; anterior lateral lobe longer, more oblique, and at its outer end wider, than either of the other two. Occipital segment widest and most prominent in the middle, scarcely equalling the transverse diameter of the posterior extremity of the glabella; neck furrow well defined, but deepest on each side, and arching a little forward in the middle; its continuations across the posterior sides of the cheeks broad, deep, and straighter than the posterior margin,—extending nearly to the lateral margins of the cheeks, where they curve a little backwards. Cheeks sloping slightly around the outer side, to a broad, shallow, undefined marginal depression, outside of which there is a moderately thick, somewhat rounded border, which does not extend entirely around the front of the glabella, but continues back into the posterior lateral spine. Eyes reniform, not oblique, nearly half as long as the antero-posterior diameter of the front lobe of the glabella, and situated slightly more than their own length in advance of the posterior margin of the cheeks; with (in casts) a moderately distinct marginal furrow around their outer bases, (height and other details unknown); palpebral lobes semicircular and depressed. Facial sutures cutting the lateral margins of the cheeks nearly opposite the posterior extremities of the eyes, and passing around the antero-lateral and front margins of the glabella, so near the anterior border as scarcely to leave any perceptible band connecting the movable cheeks around the front.

Hypostoma obscurely subtrigonal, about one-eighth wider posteriorly than its length, moderately convex; anterior margin forming a broad, regular con-

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vex curve; lateral margins contracted behind the anterior lateral angles, and converging a little posteriorly, for about two-thirds the entire length, thence more abruptly to the posterior extremity, which is transversely truncated, and provided on each side with a minute, slightly projecting point; while still farther forward on each lateral margin, there appears to be traces of another minute slightly projecting irregularity of outline. Around the anterior and lateral margins, there is a more or less distinct sulcus, behind which the posterior margin is flattened. Within this marginal sulcus there is, on each side a little behind the middle, an oblique eye-like depression.

Thorax wider than long, the length being to the breadth, as 21 to 28, nearly once and a half as long as the cephalic shield; mesial lobe as wide anteriorly as the posterior extremity of the glabella, and very slightly broader near the middle, where it is about three-fourths as wide as the lateral lobes, from which it is only separated by narrow, rather shallow furrows—most convex along the middle and flattened on each side; segments not clearly seen in the specimens examined. Lateral lobes somewhat more depressed than the mesial one, and sloping very gradually to the lateral margins. Segments equalling the antero-posterior diameter of the posterior lateral lobes of the glabella; each curving abruptly backwards at the outer extremity, and terminating in a flat, sharply pointed, or lanceolate projection, most produced in the posterior ones; provided with a deep, well defined, longitudinal furrow, which starts from the anterior side of the inner end, and passes at first a little obliquely outwards, and then straight outward, slightly nearer the posterior than the anterior margin, to the middle of the flattened scythe-shaped outer ends, where they usually curve a little backwards and become obsolete.

Pygidium nearly semielliptic, or subtrigonal, the anterior lateral angles being rounded, and the lateral margins converging to the more or less pointed posterior extremity, with a broad convex curve; slightly longer than the cephalic shield, and rather more than two-thirds as wide; mesial lobe somewhat more convex than, and two-thirds as wide as the lateral lobes, gently rounded, and tapering gradually to the posterior extremity, where it is apparently continued into an abruptly projecting caudal appendage; segments 12 to 13, straight, well defined (excepting near the termination) by distinct furrows, which are deeper on each side than at the middle. Lateral lobes with eight or nine well defined arched segments, which become more oblique posteriorly, and are defined to near the edge of the smooth margin; each divided by a furrow deeper than those between, and like those of the thoracic ribs, the anterior division being slightly shorter than the other.

Surface (of cast) smooth, excepting traces of small, scattering tubercles on the anterior lobe of the glabella.

Entire length of the largest specimen seen (exclusive of the little caudal appendage, the length of which is unknown), 4·93 inches. Length of pygidium, 1·43 inches; breadth of do. 2 inches; breadth of its axillary lobe, 0·57 inch. Length of thorax, 2·10 inches; breadth of do. 2·83 inches; breadth of its mesial lobe, 0·80 inch. Length of cephalic shield, 1·40 inches; breadth of do. 3 inches; length of posterior lateral spines, near 0·95 inch; length of glabella exclusive of neck segment, 1·30 inches; anterior breadth of same, 1·35 inches; posterior breadth of do. 0·84 inch. Length of eyes, 0·39 inch; distance of same from posterior margin of cheeks, 0·42 inch.

Named in honor of Prof. James D. Dana, of New Haven.

We have described this fine species in as much detail as possible, because it is somewhat nearly allied to several of the already described species. Perhaps it is most nearly allied to the well known European *D. caudata* of Brunich, with which it agrees in size, form and many of its details. In the first place, it differs, however, from that species in having the anterior margin of its cephalic shield decidedly more rounded than even the variety or form regarded by Mr. Salter as the female, while it shows no marginal rim (as seen from above) extending around the front of the glabella. Again, the eyes, in-

stead of being placed about *half* their own length in advance of the posterior margin of the buckler, are rather more than their *entire* length from the posterior margin. The produced spine-like appendages of its cheeks are also, in all our specimens, uniformly distinctly smaller, and only extend back to about the termination of the fourth thoracic segment, instead of to the sixth, as in *D. caudata*. On comparing the hypostoma of our species with Mr. Salter's excellent figures of that of Brunich's species, it is found to present marked and decided differences, which it would be tedious to go over in detail, and which would scarcely be intelligible without the aid of figures. In the ribs of the thorax we also observe differences, those of our species being more distinctly deflected backwards, and more sharply produced at their outer extremities, particularly the posterior ones. The differences in the pygidium are likewise well defined, its lateral margins forming almost a regular convex arch from the antero-lateral rounded angles to the caudal projection (which seems to be shorter, and is much narrower than *D. caudata*), instead of being nearly straight, or even concave in outline, posteriorly.

Most of these differences we have ascertained from a careful study of a good series of specimens, to be constant in our species, so that they can be relied upon as not being individual or sexual peculiarities.

In some respects this species is probably even more nearly allied to the common American *D. limulurus*, while in others it differs more widely. In size it far exceeds the largest examples of *D. limulurus* we have ever seen, while all our specimens show the difference in the obtusely rounded anterior extremity of the head, and the absence of a marginal rim around the middle of the front to be constant. The convex outline of the lateral margins of its pygidium, already mentioned, also contrasts strongly with that of *D. limulurus*, and even the largest specimens of our species, five inches in length, only show twelve to thirteen segments in the mesial lobe, instead of fifteen, as in the New York species. The caudal appendage, if produced at all, must also be much narrower at its origin in our species.

The greater number of segments in the mesial and lateral lobes of the pygidium, and the distinct granular surface of both *D. pleuroptyx* and *D. micrurus*, will alone serve to distinguish them from the species under consideration; while the hypostoma of *D. micrurus*, at least, is entirely different.

If the name *Dalmania* cannot be retained for this genus, in consequence of its having been previously used for a genus of *Diptera*, Hawle and Corda's name *Odontocheile* will probably have to be adopted for it, in which case this species will have to be called *Odontocheile Danæ*.

Locality and position. Two miles above Thebes, Alexander County, Illinois. Upper Silurian.

Genus LICHAS, Dalman, 1827.

Lichas cucullus, M. & W.

Glabella very convex; middle lobe strongly elevated, or subconic, nearly three times as wide anteriorly (measuring around the front) as behind, sloping abruptly from the highest point behind the middle, with a straight, or slightly concave outline, back to the neck furrow, and rounding with a regular, convex, rapidly descending curve, to the rounded front; lateral slopes declining abruptly, and separated from the lateral lobes by a linear but well defined furrow, arching forward from the neck furrow, and curving laterally on the anterior slope. Lateral lobes about half as high, and three-fourths as long as the middle one, from which they slope abruptly outwards; nearly as wide behind as the posterior extremity of the middle lobe at the neck furrow, but not more than half its breadth at the summit, and less than one-third its anterior breadth. Outside of these, on each side, the much smaller and lower palpebral lobes are separated from them by a linear furrow, similar and nearly parallel to those separating the lateral lobes from the central one.

Neck furrow moderately well defined; neck segment very much depressed below the other parts, and sloping backwards; apparently equalling the breadth across between the two outer lobes.

Surface showing, under a magnifier, small, unequal, rather scattering pustules, with smaller intermediate granules.

Length, including the neck segment, 0·70 inch, do. excluding same, 0·52 inch; height, 0·48 inch; breadth, 0·96 inch; do. of middle lobe at posterior extremity, 0·25 inch; do. of same at summit, 0·41 inch; do. of same at front, 0·60 inch.

Compared with the corresponding parts of *L. Trentonensis*, this species will be at once distinguished, by its much more elevated and differently formed glabella, as well as by its less convex lateral lobes, and the presence of a defined furrow between the lateral and the palpebral lobes. Its surface is also much less strongly and distinctly pustulose. This latter character, and its proportionally narrower neck segment, as well as its more conical middle lobe, readily distinguish it from *L. hibernicus*, of Portlock, which it more nearly resembles. It differs too distinctly from *L. Boltoni*, of the Niagara Group, to render a comparison necessary.

Locality and position. Alexander County, Illinois. Trenton division, Lower Silurian.

Genus PROETUS, Steininger, 1830.

Proetus ellipticus, M. & W.

Rather small, entire outline narrow elliptic. Cephalic shield about one-third wider than long, and slightly longer than the thorax,—semielliptic, regularly and rather narrowly rounded in front and straight behind, with postero-lateral angles produced into small spines, which extend back to the fourth thoracic segment; anterior and lateral borders with a narrow marginal rim, strongly deflected upwards, and separated from the cheek and glabella by a deep furrow. Glabella more prominent than the cheeks, including the neck segment, a little more than twice as long as wide, broader behind than in front, where it is regularly rounded, separated from the cheeks on each side by moderately well defined furrows; neck segment more prominent in the middle than any part of the glabella, about twice as wide (antero-posteriorly) as the thoracic segments, and defined by a narrower, but distinct neck furrow, the continuation of which becomes wider, but rather less sharply impressed, as it extends straight across the posterior margins of the cheeks to their lateral marginal furrows; lateral furrows of glabella, excepting the posterior ones, nearly obsolete; posterior lateral lobes small, subovate, and nearly isolated by the rather obscure lateral furrows just in front of each being directed obliquely backwards and inwards, so as to intersect the neck furrow; the other lateral lobes, of which there seems to be indications of two on each side, are very small and nearly obsolete, anterior lobe composing nearly half of the glabella. Eyes lunate, not oblique, one-third as long as the glabella, but not so prominent, situated less than their own length in advance of the posterior margin of the cheeks near the glabella, and about half their length from the lateral margins of the cheeks; reticulations very fine. Facial sutures intersecting the posterior margins of the cheeks near the middle, and extending forward from the anterior side of each eye, at first close to the side of the glabella, but soon curving outwards and obliquely forward, so as to intersect the lateral margins nearly opposite the anterior end of the glabella.

Thorax about one-third wider than long, distinctly trilobate; mesial lobe prominent, about once and a half as wide as the lateral lobe, consisting, apparently, of only eight segments; a little widest near the middle, and tapering posteriorly; segments not arching forward, but strongly arched upward, rather flattened. Lateral lobes depressed, somewhat flattened near the mesial lobe, and rounding down rather distinctly to the lateral margins; segments

narrow on their upper edges, flattened in the direction of the axis, and bent a little backwards below the knees, apparently rounded at the extremities.

Pygidium subsemicircular, but a little rounded at the anterior lateral angles; about one-third wider than long, and as long as the glabella, exclusive of the neck segment and anterior marginal rim; rather more broadly rounded behind than the anterior margin of the glabella; mesial lobe prominent, about as wide anteriorly as the lateral lobes, and tapering backwards to an obtuse point within the margin, where it ends rather abruptly and is a little depressed, but not flattened; consisting of nine or ten moderately defined segments; lateral lobes depressed below the mesial lobe, near which they are slightly flattened, thence rounding to the margins; each with about seven rather faintly defined segments, of which only the anterior one is marked with a longitudinal furrow, all extending to within a short distance of the margin, which seems to be slightly thickened.

Surface apparently nearly smooth excepting the glabella, which is covered with small, rather closely arranged granules. A row of very small granules may also be seen, by the aid of a magnifier, along the posterior margin of the segments of the mesial lobe, both of the thorax and pygidium.

Entire length, 0·78 inch; do. of pygidium, 0·23 inch; do. of thorax, 0·25 inch; do. of head, 0·30 inch. Breadth of head, 0·39 inch; do. of thorax, 0·36 inch; do. of pygidium, 0·34 inch. Length of glabella, including neck segment, 0·25 inch, exclusive of neck segment, 0·21 inch; length of eyes, 0·10 inch; distance of same in advance of posterior margin of cheeks, 0·06 inch.

At a first glance this species might be readily mistaken for *P. Swallowi*, of Dr. Shumard, from the same horizon. A more careful comparison, however, at once shows it to present well defined specific differences. In the first place, the outline of the anterior margin of its head is more regularly rounded, its entire cephalic shield longer in proportion to its breadth, while its postero-lateral angles are produced into small spines. Its glabella also differs in being a little narrower anteriorly than behind, instead of the reverse, and its sides straight instead of sinuous. The posterior lateral lobe of its glabella likewise differs in being entirely isolated by the furrow just in advance of it intersecting the neck furrow, and the other lateral furrows are less distinct than in *P. Swallowi*. Again, our species differs in having its glabella granulose, and the segments of its mesial lobe each provided with a row of minute marginal granules, instead of having "the whole surface minutely punctate."

It is very probable we should call this species *Phillipsia elliptica*, as it seems to present most of the characters of that genus. Unfortunately, the characters distinguishing these groups seem not to have been very clearly pointed out.

Locality and position. Jersey County, Illinois. Kinderhook Group, of Subcarboniferous series.

Genus PHILLIPSIA, Portlock, 1843.

Subgenus GRIFFITHIDES, Portlock, 1843.

PHILLIPSIA (GRIFFITHIDES) PORTLOCKII, M. & W.

Entire outline subovate. Cephalic shield subsemicircular, nearly twice as wide as long, moderately convex, rounded in front and straight behind, with the posterior lateral angles terminating in short, pointed, spine-like appendages extending back to the third thoracic segment. Glabella ovate, tumid, contracted and depressed behind, widest and most convex anteriorly, where it is about one-third narrower than its length from the neck segment to its rounded front, which is not margined by a projecting rim; very distinct from the cheeks in consequence of its greater convexity; posterior lateral lobes small, much depressed, and isolated by the oblique lateral furrows in front being so

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directed as to intersect the neck furrow; immediately in front of these there are, on each side, traces of another small, very obscurely defined, lateral lobe; anterior lobe ventricose, and composing much the larger portion of the whole. Neck furrow deep and broad; its continuation across the posterior side of the cheeks distinct, straight and terminating at the lateral furrows of the cheeks; neck segment prominent, twice the size of the thoracic segments, and equalling the greatest transverse diameter of the glabella in front, but more depressed. Eyes in the form of somewhat oval, ventricose tubercles, considerably lower than the glabella, from which they are separated by distinct depressions; placed about half their length in advance of the posterior margin of the cheeks, and without visible facets; palpebral lobes, depressed, not covering the eyes, but merely connecting with their inner sides, so as to leave the visual area forming an almost isolated tubercle. Cheeks sloping from the eyes into a broad, rather deep marginal sulcus, which is not continued around the front of the glabella, but extends back a little upon the lateral spine; outside of this there is a rather thick, distinctly striated marginal rim, which becomes very nearly obsolete around the front of the glabella. Facial sutures cutting the anterior margin nearly on a line with the eyes, but curving so as to leave a small semicircular wing on each anterior lateral margin of the glabella; intersecting the posterior margin of the cheeks about midway between the lateral angles and the neck segment.

Thorax nearly as long as the glabella, exclusive of the neck segment; distinctly trilobate; axal lobe slightly wider than the lateral lobes, rounded and rather prominent; its nine segments narrow and straight, or not arching forward. Lateral lobes more depressed, somewhat flattened on the inner and rounding down to the lateral margins; segments duplicated by a nearly mesial furrow extending from their inner ends out to, or a little beyond the undefined knee, beyond which they are obliquely flattened for folding together and rounding at their extremities.

Pygidium a little more than one-fourth wider than long, rather distinctly convex, rounded behind and more or less straight in front, with anterior lateral angles obliquely truncated and a little rounded. Mesial lobe very prominent and well defined, rounded above, and a little flattened or furrowed on the sides; as wide anteriorly as the lateral lobes, tapering and declining somewhat posteriorly to an abrupt, obtuse termination, about half its own greatest anterior breadth within the flattened margin; segments, fourteen or fifteen, distinctly defined, smaller than those of the thorax. Lateral lobes depressed below the mesial lobe, somewhat flattened on the inner side, and sloping to the rather narrow and more flattened border; segments ten, somewhat oblique, well defined for three fourths of the distance out, and thence less distinctly so, to within a short distance of the margin; a few of the anterior ones with an obscure longitudinal furrow.

Surface granulose, the granules being largest on the posterior portions of the glabella, palpebral lobes and neck segment. On the segments of the axal lobe, both of the thorax and pygidium, as well as on those of the lateral lobes, they are very small and regularly disposed, so as to form a single row to each segment.

Entire length, 1·19 inches; about, 0·70 inch. Length of pygidium, 0·44 inch; breadth of do., 0·56 inch. Length of thorax, 0·33 inch; breadth of do. 0.60 inch. Length of cephalic shield, 0·42 inch; breadth of do. 0·64 inch. Length of glabella, exclusive of neck segment, 0·36 inch; breadth of do. 0·24 inch. Length of eyes, 0·13 inch.

This species is remarkable for the structure of its eyes, which, instead of being, as usual, covered by the palpebral lobes, have the form and appearance of distinct oval tubercles, with the palpebral lobes very small, depressed to, or a little below the elevation of the eyes, and merely connecting with their inner side. We have not been able to see any facets in the eyes, even under a good lens, but they doubtless existed beneath the external crust.

We know of no species with which it could be, for a moment, confounded. With the exception of the above mentioned peculiarities of the eyes, it agrees well with the characters of *Griffithides*, and doubtless must be called *Griffithides Portlockii*, if that group is to be retained as a distinct genus.

Named in honor of Col. J. E. Portlock, of the Royal Ordinance Survey, of Ireland, and author of the genus.

Locality and position. Warsaw, Illinois; Keokuk Limestone, of Subcarboniferous series.

PHILLIPSIA (GRIFFITHIDES) SCITULA, M. & W.

Small, entire outline nearly elliptical. Cephalic shield semielliptic, very convex, about one-third its breadth wider than long, rounded anteriorly, and nearly straight, or more or less concave in outline behind, with posterior lateral angles produced backwards into rather stout, carinated, pointed spines, which extend as far back as the fifth thoracic segment. Glabella broadly rounded and sloping in front, where it is destitute of a projecting marginal rim; distinctly contracted posteriorly, in which region it is most elevated; separated from the cheeks on each side by its much greater convexity, and a shallow furrow, which becomes obsolete around the front; posterior lateral lobes comparatively large, subtrigonal, very oblique, depressed and isolated by the strongly defined lateral furrows in front of them being so very oblique, and produced, as to intersect the neck furrow; midway between these two lobes there is a more prominent mesial node, isolated by an accessory furrow passing across in front of it, so as to cut it off, as it were, from the narrow posterior central part of the glabella; second and third lateral lobes very small, transverse and obscurely defined by short, nearly obsolete linear furrows; anterior lobe larger than all the remaining portions of the glabella between it and the neck furrow. Neck segment a little higher in the middle (where it is provided with a minute tubercle) than the glabella, strongly arched upwards, (not forward) and more than twice as wide, antero-posteriorly, as one of the thoracic segments; neck furrow deep, broad, and arching with the neck segment. Eyes comparatively large, or half as long, and (behind) nearly as prominent as any part of the glabella, located with their posterior margins opposite the neck furrow, and less than half their own length in advance of the posterior margins of the cheeks; visual surface ventricose, or subhemispherical, smooth, or even polished, as seen under a good pocket lens, but when examined by a high magnifying power, showing numerous, regularly disposed, minute lenses, beneath the smooth, transparent, outer crust; palpebral lobes semicircular, convex, and resting upon the eyes like lids. Cheeks as compared with the size of the eyes and glabella, small, sloping abruptly from the eyes into the deep, broad, marginal furrow, which becomes suddenly obsolete on reaching the anterior lateral margins of the glabella, and extends backwards to, or even a little upon the posterior lateral, subspiniferous appendages; posterior margins with an elevated rim, strongly defined by the deep continuation of the neck furrow; lateral margins showing, as seen from above, a narrow rim, which, in a side view, is seen to be deep, vertically flattened, and marked by fine parallel longitudinal striæ; anteriorly it continues around the front of the glabella, but does not project so as to be visible from above, while its upper margin is continued in the form of a carina along the middle of the posterior lateral spines to their points. Fascial sutures very nearly as in the last species.

Thorax nearly as long as the head, but somewhat narrower, very distinctly trilobate; mesial lobe prominent, rounded and a little wider than the lateral lobes; its nine segments narrow, and subangular. Lateral lobes depressed and flattened near the mesial lobe, and so abruptly sloping from the outer side of this flattened space as to impart a slight angularity along that region; segments corresponding in size with the segments of the mesial lobe, and

distinctly kneed near the middle, outside of which they are bent down and obliqely flattened for folding together and rounded at the extremities.

Pygidium very convex, smaller than the cephalic shield, forming more than a semicircle, with the anterior lateral angles obliquely truncated; posterior outline regularly rounded, with a moderately wide, smooth, depressed, nearly flat, or sloping marginal zone; trilobation, as in the thorax, strongly defined; mesial lobe prominent, as wide anteriorly as one of the lateral lobes including its border, distinctly flattened on each side, slightly tapering to an obtuse termination, less than half its own greatest anterior breadth from the posterior edge, segments eleven or twelve, well defined above, but nearly obsolete on the flattened sides. Lateral lobes convex, but distinctly less so than the mesial lobe, horizontally flattened near the latter, with an angle along the outer margin of the flattened space, from which the sides slope abruptly to the flattened, smooth border; segments six, simple, bent down in the middle, very distinct, but terminating abruptly at the rather wide border; each with a minute pustule on the knee.

Surface of glabella and all the segments more or less granulose, the granules being larger on the posterior part of the glabella and neck segment than elsewhere.

Entire length, 0·60 inch. Length of pygidium, 0·19 inch; breadth of do. 0·27 inch; length of thorax, 0·18 inch; breadth of do. 0·28 inch; length of cephalic shield, 0·23 inch; breadth of do. 0·32 inch.

As near as can be determined by a description of the pygidium alone, this species would seem to be nearly related to *P. Cliftonensis*, of Shumard. The middle lobe of its pygidium, however, is proportionally wider than in that species, being as wide as one of the lateral lobes *including* the smooth border; while in *P. Cliftonensis* it is said to equal one of the lateral lobes *exclusive* of its border; in addition to this, Dr. S. makes no allusion to the flattened sides of this lobe, so characteristic of our species. We do not believe it always possible, however, to distinguish allied species of this genus from the pygidia alone, and hence, think it would be better if Palæontologists would never propose a species without seeing also some of the other parts. At the same time that our species *may* be identical with that described by Dr. S., it is far more probable that if we could compare entire specimens of each, we would find them entirely distinct.

We know of no described species, the head of which could be confounded with this; its comparatively large convex eyes, and distinct mesial node between the posterior lateral lobes of the glabella, and the deep vertically flattened and striated lateral margins of its cheeks are marked characters, that will readily distinguish it. Whether the proposed genus *Griffithides* is to be retained as a genus or a subgenus, this must be included in it, since it has the posteriorly contracted glabella and smooth eyes of that type. We do not believe, however, that non-reticulated eyes in any type of *Trilobites* proves them to have been blind, for as in this case, they were doubtless always provided with minute lenses beneath a transparent outer crust.

Locality and position. Upper Coal Measures, Springfield, Illinois.

Phillipsia (Griffithides?) Sangamonensis, M. & W.

Entire outline elongate subovate. Cephalic shield very convex, forming more than a semicircle, and about one-third wider than long; regularly rounded in front and straight behind, with posterior lateral angles produced into rather broad, carinated, pointed or subspinous appendages, equalling in length the distance from the posterior side of the cheeks to the anterior end of the eyes. Glabella ventricose, very prominent, separated from the cheeks on each side by a moderately distinct furrow, which also passes around the front; most convex behind the middle, thence rounding and declining to the rounded front, about one-fourth longer than wide, and slightly wider between

the eyes than anteriorly; sides nearly parallel, but a little sinuous at the middle; posterior lateral lobes comparatively large, subtrigonal or tuberculiform, and entirely isolated by the distinct lateral furrows passing obliquely across with a backward curve, from opposite the middle of each eye, so as to intersect the neck furrow; second lateral lobes much smaller and more obscure than those behind, and also oblique, being merely defined by a faintly impressed, curved, oblique line; in advance of these there are also obscure indications of two other short, nearly obsolete lateral furrows, scarcely visible without a lens. Occipital segment well defined, but lower, and considerably shorter in its transverse diameter than the glabella; strongly arched upwards, (not forwards) and projecting backwards a little beyond the posterior line of the cheeks; neck furrow distinct and arching upward with the occipital or neck segment; its continuation along the posterior sides of the cheeks very deep, and nearly straight for about two-thirds of the way across towards the lateral margins, where it intersects another furrow or depression, coming around the sides of the cheeks. Eyes lunate, rather large, or nearly half as long as the glabella, exclusive of the neck segment, prominent, but not as high as the glabella, located about half their own length in front of the posterior margin of the cheeks; visual surface smooth, or even apparently polished, and showing no traces of lenses under a good magnifier; palpebral lobes convex, and not depressed, but resting like a lid upon the eyes. Cheeks subtrigonal, declining abruptly from the eyes; lateral margins turned downwards, and forming below a sharp edge, which continues back along the lower margin of the posterior spine-like appendages; above this there is a vertically flattened, or even concave zone or belt, extending from near the front part of the glabella around the outside of each cheek, and becoming a shallow furrow as it passes back upon the spines, along which it seems to be more or less marked nearly to their pointed extremities; between this vertically flattened band and the eyes, there is another nearly horizontally flattened, or outward sloping zone, extending around each cheek from near the front posteriorly, so as to unite with the lateral continuations of the neck furrow behind, and continue as a single furrow along the upper outer margin of the posterior spines, thus leaving a more or less defined mesial ridge between these two furrows, the entire length of the posterior lateral spiniferous appendages, as well as around the cheeks to near the front of the glabella; posterior margins of the cheeks, behind the continuations of the neck furrow, very prominent, or forming a thickened rim. Facial sutures extending obliquely forward and outward from the anterior side of the eyes, and again curving inwards, so as to cut the anterior margin nearly on a line with the anterior inner extremity of the eyes; from the posterior end of the eyes, directed obliquely outwards and backwards, so as to intersect the posterior margin nearly midway between the neck segment and the subspiniferous lateral posterior appendages.

Thorax only known from a few of the posterior segments, which show the mesial lobe to be wider and distinctly more prominent than the lateral lobes, which are flattened near the mesial lobe, and abruptly deflected downwards near the middle; segments divided by a furrow near the anterior side from the knee inwards, and flattened in the direction of the axis at the rounded outer extremities.

Pygidium semielliptic, slightly wider than long, and rather convex, distinctly narrower and a little longer than the cephalic shield, narrowing backwards and very narrowly rounded at the posterior extremity. Mesial lobe prominent, a little flattened on each side, and narrower than the lateral lobes, from which it is distinctly separated by broad, strong furrows; tapering gradually backwards, and terminating rather abruptly nearly one-third its own length from the posterior margin, so as to leave a broad, nearly flat, or more or less sloping, smooth border, which extends along each side the whole length of the pygidium, but becomes narrower anteriorly; segments of mesial lobe, eighteen, well defined, rounded and very nearly or quite straight. Late-

ral lobes more depressed, and about one-third or one-fourth wider than the mesial lobe, rounding down rather abruptly to the lateral margins; segments nine or ten, rounded, simple and separated by distinct furrows; all terminating abruptly at the inner edge of the broad, smooth, marginal zone.

Entire surface apparently very nearly smooth.

Length of cephalic shield, exclusive of spiniferous appendages, 0·45 inch; breadth of same, 0·66 inch; height of do. 0·31 inch. Length of glabella, exclusive of neck segment and anterior border, 0·36 inch; breadth of same, across the posterior lateral lobes, 0·29 inch; do. of same across the constricted central region, 0·25 inch; do. of same anteriorly, 0·28 inch. Length of eyes, 0·18 inch; height of same behind, to top of palpebral lobes, 0·08 inch. Length of pygidium, 0·50 inch; breadth of same, 0·55 inch.

This species seems to combine the characters of *Phillipsia* and *Griffithides*, as usually understood, to such an extent as to apparently warrant Prof. Koninck's opinion that these two types can scarcely be regarded as constituting entirely distinct genera. In its somewhat swollen glabella and smooth eyes, it agrees with the characters assigned *Griffithides*, while in almost all its other characters, it corresponds to Portlock's definition of his genus Phillipsia. We know of no species with which it is liable to be confounded.

Locality and position. Springfield, Illinois. Upper Coal Measures.

NOTE.—In our paper published in the Proceedings of the Academy for Aug., 1865, p. 154, we proposed the name *Sphærocrinus* for a section of the genus *Actinocrinus*, of which our *A. concavus* is the type. Since that time, we observe Roemer had previously used the name *Sphærocrinus* for another group; hence we now propose for our type the name *Œlocrinus*.

December 12th.

The President, DR. BRIDGES, in the Chair.

Twenty-one members present.

The following paper was offered for publication:

"Second Contribution to the History of the Delphinidæ." By Prof. E. D. Cope.

Prof. E. D. Cope exhibited the skeleton of a seal which was shot near Cambridge, Maryland, on an arm of Chesapeake Bay, eighteen miles from salt water, by Mr. Daniel M. Henry. It was a species of Cystophora, or hooded seal, measured 6¾ feet, and weighed, when living, about 330 lbs. The skin was not preserved, but the fur of the extremities was straw-colored. The nails very strong and extended much beyond the palmar integument in its dried state.

Whether this species is the C. c r i s t a t a or a n t i l l a r u m can not be determined, owing to the imperfection of extant descriptions. The c r i s t a t a has been taken as far south as New York.

DeKay, in his Zoology, mentions a seal recorded by Mitchill as having been taken high up the Chesapeake, near Elkton. It was probably the same as the present.

Prof. E. D. Cope also exhibited some specimens of crania of Cetaceans of our coast, and stated that the only species which could as yet be proven to belong to our fauna were the following:

Balæna cisartica, or Southern Right Whale.
Megaptera osphyia, The Humpbacked Whale.
Orca, sp., The Killer.
Globicephalus intermedius, or melas, The Black Fish.
Beluga canadensis, The White Whale.